GrummanWorld

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Surface Motion. *Tony Bozzo adjusts an accelerometer on the F-14A+ Tomcat. The plane recently underwent tests at Calverton to measure its natural vibration characteristics. (Photo by Rich Breunig)*

Super Tomcat Passes Shake Tests With Ease

The F-14A+ Super Tomcat recently got a shakeout in Calverton.

This powerful version of the F-14 is scheduled to be flight tested early next month. The shaking was for the ground vibration survey, a procedure that measures how a plane's surfaces naturally vibrate. This information, coupled with a computer program, predicts how the aircraft will react at various speeds and altitudes — which becomes the plane's flight envelope.

The aircraft completed the six-day test without a hitch, with results parallelling those of earlier ground vibration tests. "The new GE engines give the Tomcat a higher thrust-to-weight ratio," says John Flynn, an engineer for Engineering Test Operations. "The ground vibration survey ensures that the new engines haven't changed the vibration characteristics of the plane."

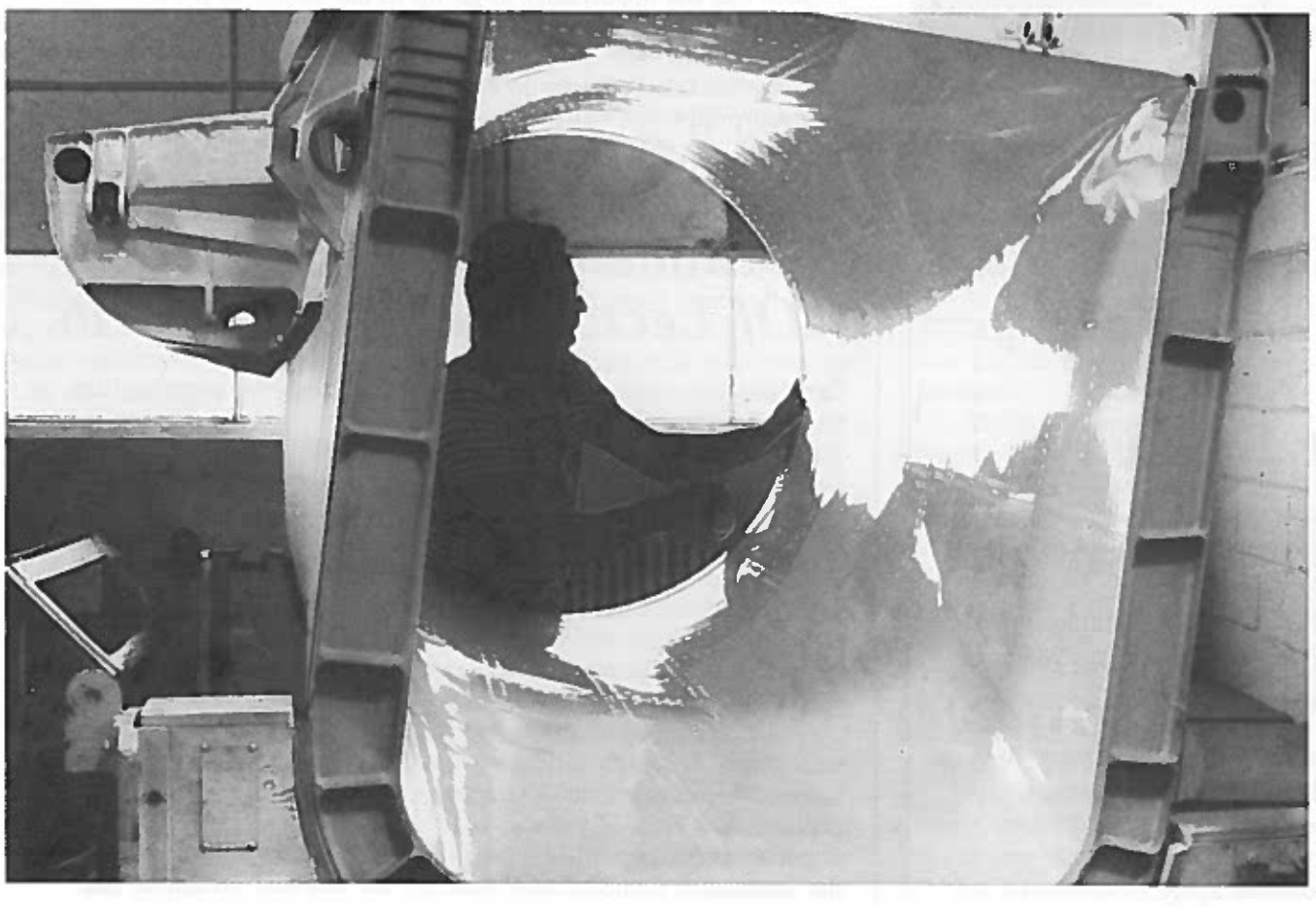
Flynn points out that while the Super Tomcat was flight tested in 1981, there have been some modifications since then. "This Super Tomcat is structurally very similar to the next-generation F-14D," he says. "Aerodynamically, it is identical. This ground vibration survey will suffice for the F-14D and the data gathered from it will help clear the plane for high speed flight."

For the tests, the Super Tomcat was placed on air springs, enabling unrestricted movement. This simulated how the aircraft behaves in flight. Hundreds of small measurement devices called accelerometers were glued to all parts of the aircraft. A control system in a van fed signals to electrodynamic shakers, which rocked the plane. These look and operate like large stereo speakers.

The measurement system converted the accelerometers' signals to three-D drawings of the aircraft's motions. Changes in frequency varied the vibration, and each mode of vibration created a different drawing.

During the test, the aircraft was in simulated flight with all systems on except the engines. The tests were performed in one wing sweep configuration, and with the wing fuel tanks partially and completely full. The fuselage tanks were kept full.

The ground vibration survey usually takes place right before the first flight. In this case, the Super Tomcat's powerful new GE engines will have additional engine run tests prior to the flight test program.■



Sealed And Delivered. *Frank Abbondondolo, leadman for the F-14 Nacelle Department in Building 1, Bethpage, reseals the inner barrel of an F-14 nacelle after painting. The nacelle will be used to house the plane's left engine. (Photo by Bob Settles)*

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New Boats Make Waves At Dealers' Meeting

The Grumman Boats fleet has become a full-fledged navy with the addition of 18 new boats to its 1987 line.

The new boats were christened for the marketplace at Grumman Boats' annual dealers meeting, which was held in Cortland, New York. About 165 dealers, members of the boating press and other boating enthusiasts had a dry-dock view of the new models — and they apparently liked what they saw.

"We wrote $2.2 million in orders at the meeting and expect that number to grow to $3.5 million," says Bob Steinway, president of Grumman Boats.

During the two-day meeting Grumman Allied President Ron Peterson gave attendees a run-down on Grumman Corporation and Steinway briefed them on Grumman Boats. There were also sessions on selling and product reviews.

Steinway expects a 35 percent increase in sales next year over 1986. That would come in the wake of a 30 percent sales increase this year.

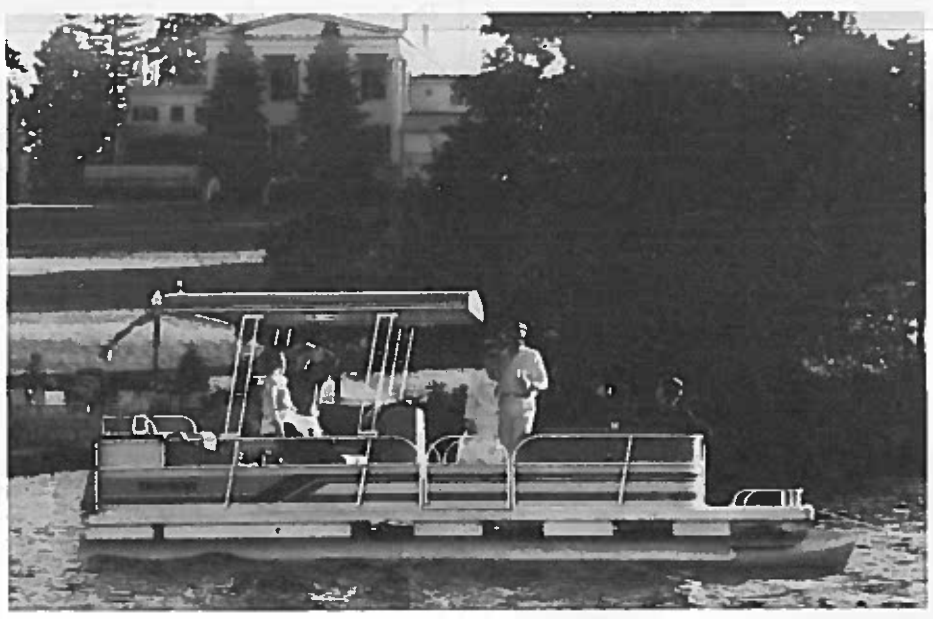
"What's more impressive than the number of orders we took at the meeting," Steinway explains, "is that the average order is 53 percent higher than last year."

The increase is due, to a great extent, to the additions to Grumman's aluminum boat line. Among them are a Master Fisherman series, a deluxe pontoon boat, a 20-foot "fun and fish" pontoon, a new bass boat and several new sport fishing boats.

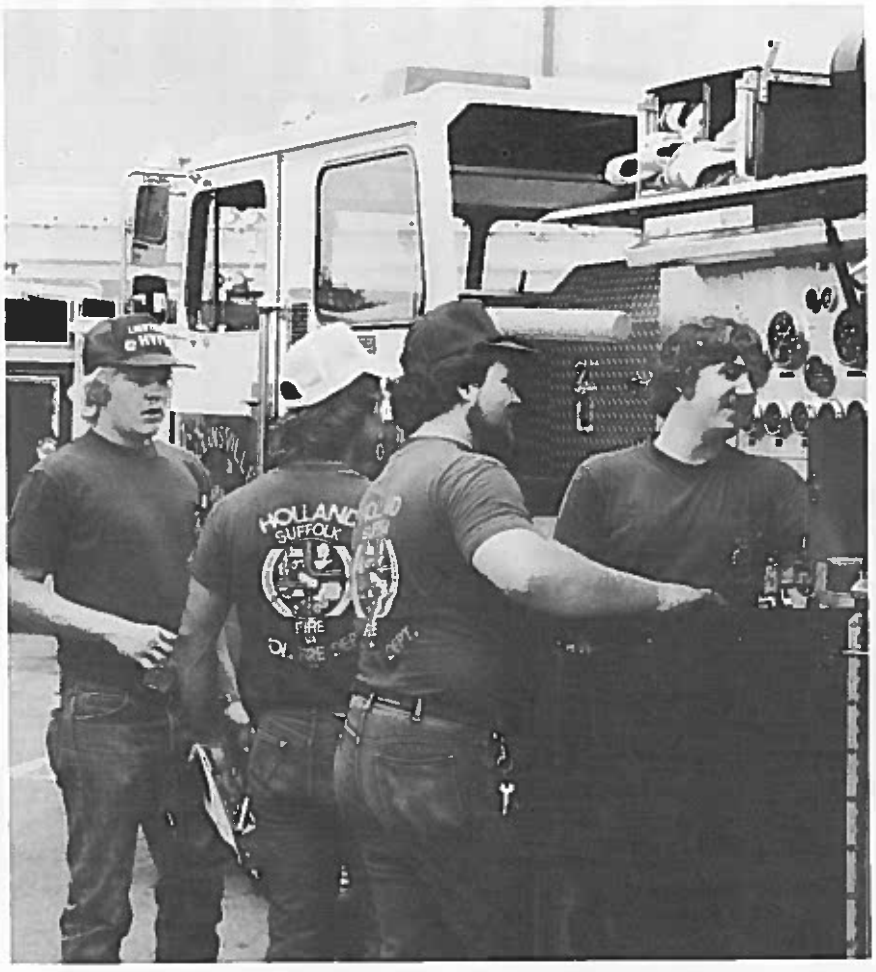
"The Master Fisherman series is designed to fit into a price gap in the market," Steinway explains. "Our Professional series sells at the low end of the market and then our customers had to make a $4,000 jump to the Ultra Fisherman. The Master Fisherman lets them buy gradually."

The new pontoon boats extend Grumman's highly successful Funship line, says Steinway. The 24-foot deluxe model will appeal to those who like to party on the water; the Fun and Fish version has pedestal seats and live-wells.

Grumman's pontoon boats were introduced only this year. Yet, the demand for these party boats has been so great that a second production line, identical to the original in Arkadelphia, Arkansas, is being installed in Marathon. It should be running later this month.■



Party Time! *Pontoon boats are built to carry a crowd. The flagship of Grumman's pontoon fleet is this new 24-foot 'Funship.' The whole Grumman pontoon line has become so popular that a second production line had to be started.*



Collinsville's Pride. *This pumper was brought to Grumman Emergency Products open house by the Collinsville, Virginia, fire department. About 700 firefighters turned out for the affair. (Photo by Bob Sagliocca)*

Firefighters Journey To Roanoke Open House

ROANOKE, Virginia — About 700 firefighters from throughout the Eastern U.S. turned out recently for an open house at Grumman Emergency Products.

"It rained heavily in the afternoon, which kept away a lot of the local people," says Bill Bruns, vice president—Marketing for this unit of the Allied Division. "But we're still very pleased with the turnout. People came from as far away as Alabama, Georgia, and New Jersey."

Twenty of Grumman's current pumpers were on display — all driven in by the fire departments that own them. In addition, a West Virginia fire department brought a vintage 1944 Oren pumper. Oren Roanoke was the company acquired by Grumman in 1977. About 15 Grumman suppliers displayed their wares.

There were hourly tours of the company's three plants, and attendees had the opportunity to go up in the basket of the AerielCat's ladder. One of the lighter activities of the day was an egg-drop contest. The ladder was raised about 30 feet, and eggs were dropped from the basket. People who caught the most without breaking them received prizes.

Work Force Reduced 20 Percent At Kennedy

On September 5, 142 Grummanites in the Technical Services Division at Kennedy Space Center, Florida, were notified that their employment will be terminated effective September 19.

A day earlier, NASA announced the loss of 1,110 contractor jobs at Kennedy Space Center due to the postponement of Space Shuttle flights until early 1988.

Fred Haise, president of Technical Services, said that job placement services will be made available to all affected employees, including resume preparation and referrals for job opportunities at other Grumman divisions. Assistance will continue after the termination date. The division's work force will be reduced 20 percent.

Grumman is a subcontractor to Lockheed Space Operations Company on the NASA Shuttle Processing Contract at Kennedy Space Center and Vandenberg Air Force Base in California.

Grumman-sponsored Series Of Lectures Begins Sept. 16

Grummanites can stay on top of high technology by attending the Leroy Grumman Lecture Series.

The first lecture of the series will be held in the Headquarters auditorium in Bethpage on Tuesday September 16, at 4:30 p.m.

The guest speaker will be Dr. Kenneth Wilson, director of the Theory Center at Cornell University, and winner of the Nobel Peace Prize in physics. He will discuss supercomputers — powerful systems used heavily for such scientific and engineering computations as weather prediction and aircraft flight simulation. Wilson will also discuss how future supercomputers will be used for material sciences and other research.

Guest speakers at the future lectures will include scientists from universities, research institutions, and government agencies. Topics will include aerodynamics, electronics, physics, and information processing.

The series was established in honor of Leroy Grumman, one of the company's founders and its first chairman and president. The series seeks to continue his commitment to technical excellence.

All Grummanites are invited, but space is limited. To make a reservation, call Susan Boccasini at Ext. (111) 63396 or 53766.

Grumman Takes A Plunge To Study Space Repairs

Astronauts normally are more at home in a space suit than a wet suit.

But at NASA's Marshall Space Flight Center in Huntsville, Alabama, underwater tests were recently undertaken to help determine ways to fix the Space Station in orbit.

The tests were part of two studies Grumman's Space Systems Division is conducting for NASA-Marshall. Grumman recently wrapped up a study of Space Station servicing, while a study about Station repairs will continue through next year. Both are very complex issues, due to the operating environment in space and the fact that the Space Station itself is still in its early stages.

"In zero gravity, objects behave as they do under neutral buoyancy conditions in water — they float," says Roy Olsen, project manager for the servicing study.

Marshall's Neutral Buoyancy Simulator, a 50-foot-high water tank, creates these conditions. "Astronauts wear pressure suits and weights so they float as they would in orbit," notes Olsen.

The tests included repairing a hole in a wall, replacing a window, and replacing a reaction control system thruster module. The first test was conducted for the repair study, while the other two were done for the service study. A service job in space involves replacing damaged or worn-out equipment, while a repair job entails patchwork.

Two men acted as astronauts: Don Peterson, a retired astronaut who is a consultant to Grumman Space Systems Division, and Charlie Van Valkenburgh of Essex Corporation, a Grumman subcontractor on the project. The equipment used in the tests was built by Grumman's Model and Wood Shops in Building 5. It consists of a wall, two windows, three patch areas, and a thruster unit.

Quite a few other people were in the tank, among them Grummanites Eric Byler and Dan Guinan and NASA's utility and safety divers. Byler and Guinan have been heavily involved with the study from the beginning, and since both are qualified divers, they were able to provide underwater assistance.

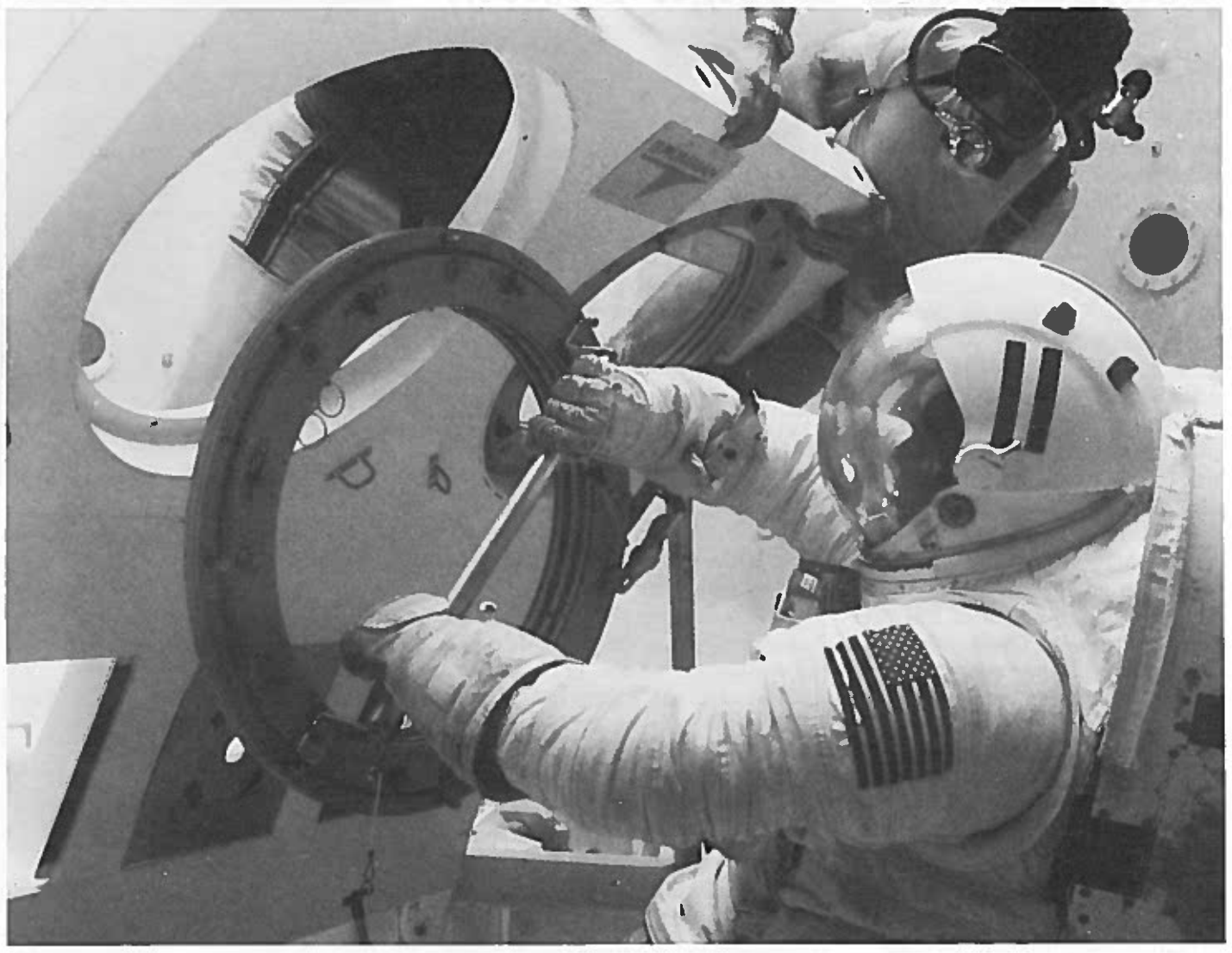
In all, four days were devoted to the tests. The actual diving time on each day only lasted for about two-and-a-half hours. The rest of the day was spent in briefings, debriefings, and preparation for the next day's work.

The tests used NASA aids, such as the manipulator foot restraint mounted on the shuttle's robotic arm — and specially-developed tools. "A Grumman-developed adjustable waist restraint, which the astronaut attaches to the exterior of the structure, proved very helpful," says Olsen. "It keeps the astronaut at a fixed distance from his work."

Nuts and bolts can also create headaches because in zero gravity they would float away, eluding the astronauts' grasp. For this reason, the mockup structure has "captive" bolts — they don't come all the way off. They merely have to be loosened for dissembling a structure, then retightened during reassembly.

The Marshall simulation tank is used frequently by NASA and its contractors for space research. There are only two others like it in the U.S. For the station repairs study, which is headed by Grummanite Lou Levoy, additional underwater tests are set for next spring.

"The Challenger accident has pushed back any Space Shuttle experiments that ordinarily would follow the underwater experiments," says Olsen. "However, there may be tests aboard NASA's KC-135 — known in the space community as the 'Vomit Comet.' It gets its nickname from the fact that it can simulate zero gravity for approximately five minutes by taking a long nosedive."■



In The Deep. *In a diving tank at NASA-Marshall, Essex's Charlie Van Valkenburgh practices replacing a window on a Space Station mockup. The giant tank simulates the zero gravity of space, thus enabling technologists to determine the best ways to fix the Station when it goes into orbit. (NASA photo)*

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Dely, Nightingale Get New Posts

Vice Presidents Steve Dely and Ray Nightingale were given new posts at the August 21 meeting of the Grumman board of directors.

The board elected Dely vice president and assistant to the president of Grumman Corporation. Dely joined Grumman Allied in 1971 as corporate counsel and director of personnel services. He eventually became vice president—human resources for Grumman Allied. In 1982, Grumman Corporation named him director of human resources.

In 1985, he was elected vice president—resources and administration for the Electronics Systems Division.

The board appointed Nightingale vice president, Electronics Systems. It also elected him secretary and director of Tachonics Corporation. Tachonics is the Electronics Systems unit that was set up last year to manufacture integrated circuit chips from gallium arsenide.

Nightingale began his Grumman career in 1969 as deputy director of operations planning and budgets. When Grumman formed Paumanock Leasing Services, Inc., in July 1973, Nightingale was elected vice president—operating manager. The subsidiary was later renamed Grumman Credit Corporation, and he was elected its president in 1974.

He later served as vice president—staff operations and administration for Grumman Aerospace. He had been vice president and assistant to the president at Grumman Corporation since April 1985.■

New Assignments

Three Grummanites recently received new assignments in Data Systems. Joe Vecchio has been named director of Contracts. Joe Stalk has been named assistant to the president. Chuck Abramo has been named assistant director of Network Support.

Match To Drop

The company's matching contribution to the Employee Investment Plan will decrease to 58 percent for the fourth quarter of 1986 — down from 65 percent for the third quarter of this year.

The match rate floats between 50 and 100 percent, according to Grumman's financial performance during the preceding four quarters. This latest change reflects the performance over the last two quarters of 1985 and the first two quarters of 1986.

Grumman Olson Wheels In Computerized Design System

Versatile Grumman trucks take shape on CADD

STURGIS, Michigan — Computer-aided design and drafting (CADD) is helping Grumman Olson adapt its popular aluminum truck bodies to the needs of an even wider range of fleet owners.

The McAuto Unigraphics II system was first used for final design work on the Postal Service's Long Life Vehicle, and later for the new Olson "V"-body truck. Its current assignment: helping engineers in the mating of the Kurbmaster truck body to Isuzu and Iveco chassis.

"In our industry, it's not a matter of whether you go CADD — it's when you go CADD," says Ed Mackay, vice president of Engineering for Grumman Olson. "We needed a smaller, standalone system, not a large system like the Grumman Engineering and Manufacturing System used by aircraft designers. The McAuto Unigraphics II met our requirements."

The Unigraphics system consists of a computer, output plotter, software, and two graphics workstations. It is linked to an identical system at the Corporate Development Center in Bohemia, Long Island, where a lot of the development work for Allied and other commercial projects takes place. Two more workstations will be added at Sturgis next year..

For the Isuzu and Iveco projects, more than the usual amount of redesign was necessary on the Kurbmaster body.

"We've been building on Ford and GM chassis for years," says Wally Trine, CADD systems manager. "Their engines and front axles are forward on the chassis frames. The seat, and thus the doors, on the basic Kurbmaster truck body are behind the front wheels.

"The Isuzu and Iveco chassis, however, are different. The engines and front wheels are further back on the chassis, with the the drivers seat in front of both. Therefore, the basic Kurbmaster body was redesigned on CADD to adapt this new chassis configuration to our existing Kurbmaster body."

The new version of the Kurbmaster will keep many of its other features. One of their selling points is easy access. "The driver can step in and out fast, while carrying arm loads of packages," says Trine.

Among the important data provided by the CADD system are: a truck's center of gravity, the driver's visibility, and surface area of the body. This last fact is being used by the LLV team to determine the amount of paint the program will require.

Yet another helpful tool is the system's flat pattern program. This program tells the engineer how big a piece of metal should be before it is bent into a particular shape for a truck body part. Before, the engineers had to depend on hand calculators, with a greater chance for error.

"We do a lot of sheet-metal forming here, and this program has been quite helpful to us," says Trine. "We're not in a high-volume business, so we're not talking about savings on scrappage. What it does save is the time and effort of the guy in the shop setting his machine up."

Engineering drawings don't just pop up onto the CADD screen — these three-dimensional views draw themselves in the space of a few minutes, depending on the complexity of the design. It looks like an ultrasophisticated Etch-A-Sketch. To study a drawing from every possible angle, a button can be pushed, and the drawing rotates. Press another, and the screen zooms in for a close-up.

In addition to new products, the CADD system will prove beneficial to custom modification work. Grumman Olson aluminum-bodied trucks are workhorses for all kinds of businesses, and customization is Olson's forte.

Among the simple options are air vents for laundry services. Much more complex are half-cabs, often requested by utilities firms. The front cab is half the width of the rest of the truck. In the space where the passenger seat might be, an aerial ladder for fixing power lines gets stowed.

"Basically we produce custom bodies," says Mackay. "The CADD system will make this type of modification work easier."

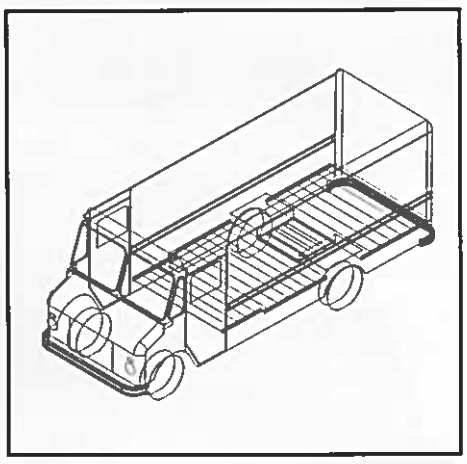
Mackay says the CADD system will be enlarged over a five-year period, "and, we hope, by then we'll have combined it with CAM (computer assisted manufacturing)."

In CAM systems, engineering designs produced on a CADD system never leave the computer. They're converted into instructions to run automated shop machinery.

Sturgis now has two automatic turret punches for sheet metal work, which are computer numerically controlled. That means they have their own separate control computers, and instructions for machine functions are programmed on tape.

"Soft tooling — tape programs — enable us to keep less inventory, less tooling, and fewer templates," says Mackay. "That's important. The custom nature of our work means we have to store thousands of those items for our conventional machines."

Initially, there was some hesitancy to acquire a system from McDonnell Douglas, rival of Grumman's Aircraft Systems Division. "But when I was in St. Louis for training, I saw several Grumman Olson trucks," Trine notes. "They all had 'McDonnell Douglas' painted on the side, with the chrome Grumman logo on the front, and Grumman Olson tire flaps."■



A Sketch In Time. *In the above photo, operator Barbara Loudenslager inputs an engineering drawing into the Unigraphics II CADD system. The Unigraphics II has assisted Grumman Olson not only on new products, but on customizing existing products. To study the drawing from every angle, Loudenslager can push a button, and it rotates in any direction. The system also has a zoom feature. At left is an example of the system's handiwork.*

Five PC Classes On Fall Agenda

Due to popular demand, the Grumman Data Systems Institute will offer five fall classes on the IBM Personal Computer.

The PC Software Applications course spans 32 hours, and each class meets from 6 to 10 p.m., Monday through Thursday for two weeks. The starting dates are September 8, September 22, October 6, November 3, and November 17. All the classes meet at 250 Crossways Park Drive in Woodbury, Long Island.

The course fee for Grummanites is $425; the regular fee is $495.

Beginning October 20, the Institute will offer a 16-hour Lotus seminar. The course fee is $425 for Grummanites.

Also beginning October 20 is the professional Computer Aided Design and Drafting (CADD) course. This 40-hour course enables the professional draftsperson to learn the latest computerized systems and methods. The fee is $795 for Grummanites, $895 for others.

"In addition, we are looking into creating courses in Ada and CICS," says Phil Cincotta, marketing director for the Institute. Ada is the Department of Defense's computer language, while CICS is a business-programming language.

For further information, call (516) 364-2055; in Suffolk County call (516) 467-6690.

Personals

My family and I wish to thank all of my co-workers and ESO for their thoughtfulness and sympathy during the recent loss of my brother. **Ken McDonough**

My family and I wish to thank my co-workers and ESO for their thoughtfulness and sympathy during the recent loss of my father. **Chuck L'Hommedieu**

My family and I would like to express our sincere thanks to my friends, co-workers and ESO for their kind expressions of sympathy during the recent loss of my mother. Your thoughtfulness will long be remembered. **Charlie Long**

My family and I wish to express our sincere thanks and appreciation to all our friends, co-workers and ESO for their kind expressions of sympathy during the recent loss of my husband Ernest. **Ann E. Borysewicz**

My family and I wish to thank all of my co-workers and ESO for their kind expressions of sympathy during the recent loss of my mother. Your kindness will long be remembered. **Dick Eberl**

My family and I wish to thank my co-workers and ESO for their kind expressions of sympathy during the recent loss of my mother. **Pasquale Aronna**

My family and I want to thank all of our Grumman friends for their kind expressions of sympathy on the recent loss of my wife Theresa. **Edward Grinkovitch**

I would like to thank all my friends, co-workers and ESO for their kindness and well wishes during my recent illness. **Florence Harvey**

I wish to thank my co-workers and ESO for their concern and kind expressions of sympathy during the recent loss of my wife Gale. **Bob Barrington and Family**

My family and I would like to thank our friends, co-workers and ESO for their kind expressions of sympathy during the recent loss of my father. **George Dunn**

We wish to thank the Grumman family for their outpouring of support, assistance and love given to all of us. Chuck accomplished so much in his life and we are very proud of him, and he was extremely proud of all of you. Thank you for helping us to cope at this time of grief. **The Sewell Family**

Top Cat: Top Dog In Electronic Combat

Weaving in and out of the sky at 30,000 feet, the X-29 and an enemy plane engage in combat. The X-29 slips in behind its foe, fires a missile, and destroys the enemy aircraft.

But no life has been taken and no aircraft lost because this scenario describes mock combat that goes on routinely inside a computer.

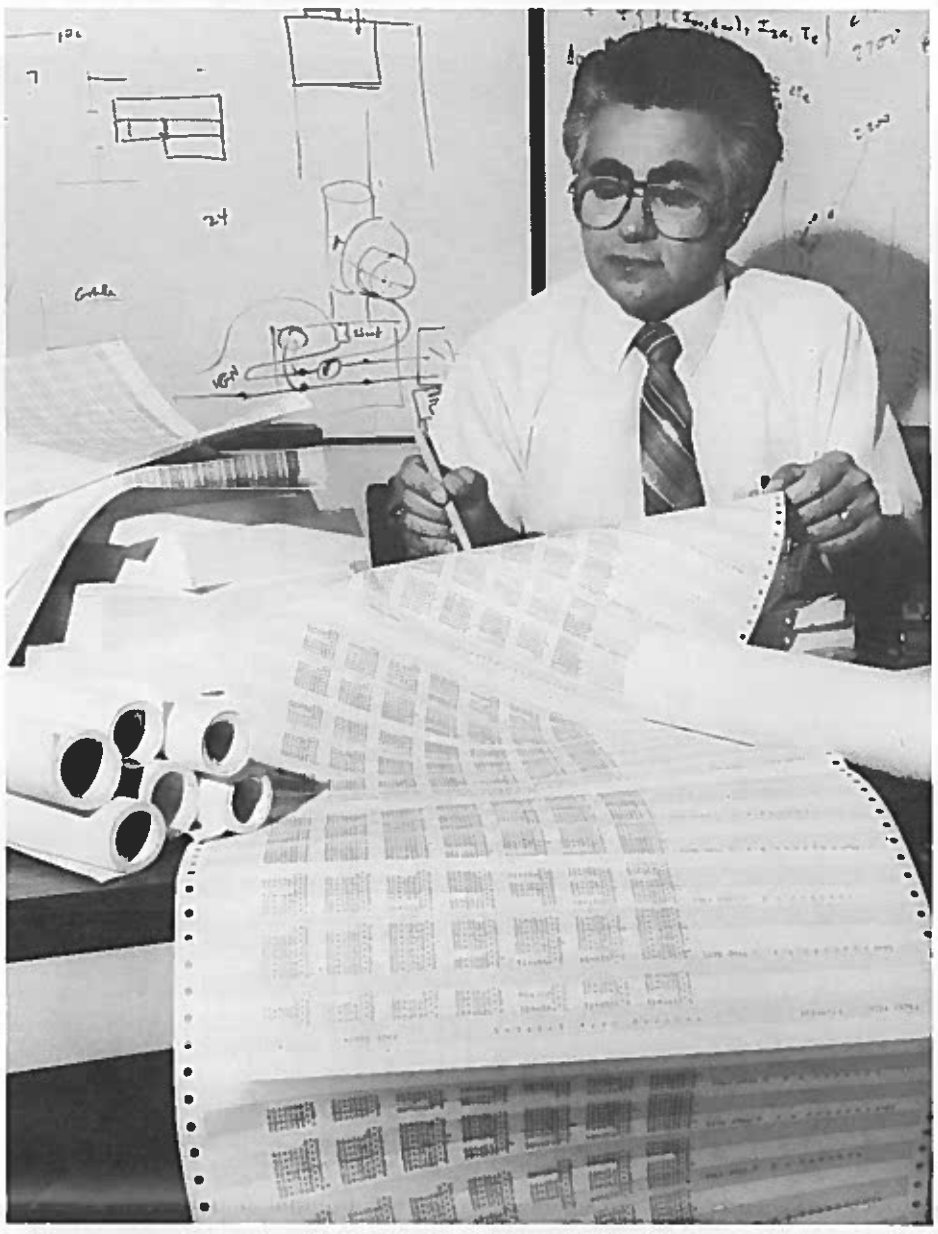
Grumman is analyzing the combat performance of its X-29 — an experimental technology demonstrator — by using a one-on-one computerized dogfight. The objective: To determine how well the forward-swept-wing X-29 performs compared to aircraft with conventional aft-swept wings.

The X-29 simulated dogfight is the latest application of Grumman's Tactics Optimization and Combat Analysis (Top Cat) computer program. Designed in 1969 by Mike Falco of the Corporate Research Center, Top Cat is used to determine the best air and land maneuvers for planes or other vehicles to survive combat engagements. Each system developed under the Top Cat program can do this by using previously analyzed combat scenarios to anticipate battle events.

'With Top Cat, thousands of X-29 missions can be flown...'

"When we started investigating a Top Cat approach, the term artificial intelligence (AI) — using a computer for decision making — did not exist," says Dick Gran, who heads the Dynamics and Control Theory Laboratory at the Corporate Research Center, Bethpage. "But, actually, Top Cat uses a form of AI to develop winning strategies."

In just the last few months, the X-29 and the enemy plane locked horns over a million times. "It would be impossible for these combat scenarios to be played out conventionally," says Gran. "With Top Cat, thousands of X-29 missions can be flown, with each one considering all combinations of initial conditions. These conditions include detailed characteristics of the airplanes and weapons — short range missiles and guns."



Reams And Reams Of Statistics. *Charlie Giannetto Sr. looks at printouts for the latest application of Grumman's Top Cat program. The numbers represent flight control system data of the dogfight scenarios. The results are then compressed in pie and bar graphs.*

Each simulation is played in the time a dogfight would take — about 60 seconds. "In the air, two planes would be travelling at 600 miles per hour at an altitude of 30,000 feet," says Charlie Giannetto, Top Cat project leader. "Once they spot each other, they'll go at it. It only takes seconds to shoot down a plane."

Although the computer and Top Cat make the game moves, a person is needed to set the stage for a simulated dogfight. Starting conditions must be determined: direction,

'It only takes seconds to shoot down a plane.'

angle and range of attack in degrees must be plotted; and type of weapon and enemy chosen.

The Cray supercomputer — one of the fastest systems in the world — takes over after this. The computer randomly selects one of 12 strategies from its Top Cat program, and the air combat begins.

Like an Etch-A-Sketch, the computer silently draws the board as well as the combat paths and maneuvers. The X-29 appears as a blue triangle and the enemy as a red square. A solid line indicates the path of each plane, and two dotted lines per plane show a side view and overview, respectively.

The tactics employed are those used by U.S Air Force pilots. In the computer, these are carried out by flying up or down, turning left or right, or accelerating. Top Cat also randomly places each plane in one of the 10,000 available regions on the screen.

"Those regions are similar to chess squares," says Gran. "In both chess and the dogfight game, the farther the opponent is away from you, the more uncertainty there is. As the pieces of each game are moved towards each other, the closer you are to the final outcome."

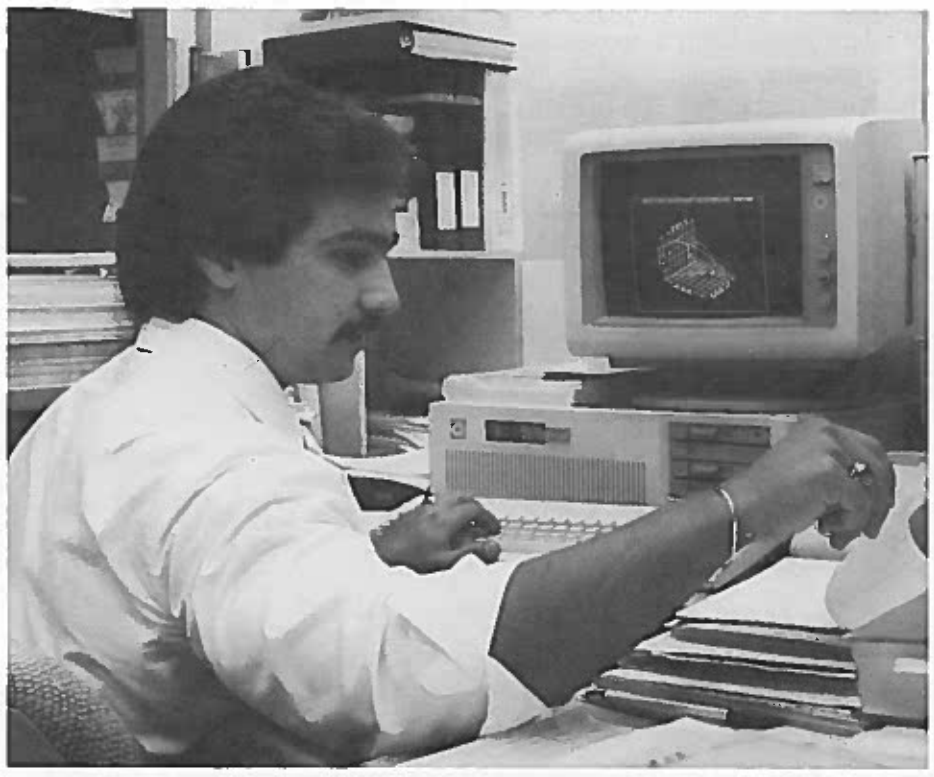
At the end of the battle, the Top Cat program analyzes what took place and compares it to the action in preceding dogfights. Then the program incorporates favorable combat strategies into each successive dogfight until it determines the best strategy for winning.

'Top Cat has saved millions of dollars.'

So far, Top Cat comparisons of the X-29 and conventional fighter aircraft have produced favorable results for the X-29: It has a 2 to 1 advantage in combat.

Grumman hopes the X-29 battle strategies will eventually be stored in an on-board computer and provide pilots with the tactical advice needed to survive.

If so, the computerized dogfight will have helped make it possible, according to Giannetto. "It has saved millions of dollars," he says. "To accomplish the same results in real flight testing, it would cost at least $10,000 an hour. Grumman's computerized system is 'Top Dog' — no bones about it."■



Staging The Scenario. *Charlie Giannetto Jr., associate engineer, Building 35, Bethpage, sets up another dogfight. Although the computer and Top Cat operate the game moves, Giannetto Jr. will determine the starting conditions, which include direction of attack and type of weapon. (Photos by Bob Settles)*

Unit Values

The Grumman Employee Investment Plan has reported the following unit values as of June 30 (compared to July figures):

Equity Fund
3.785 up from 3.766

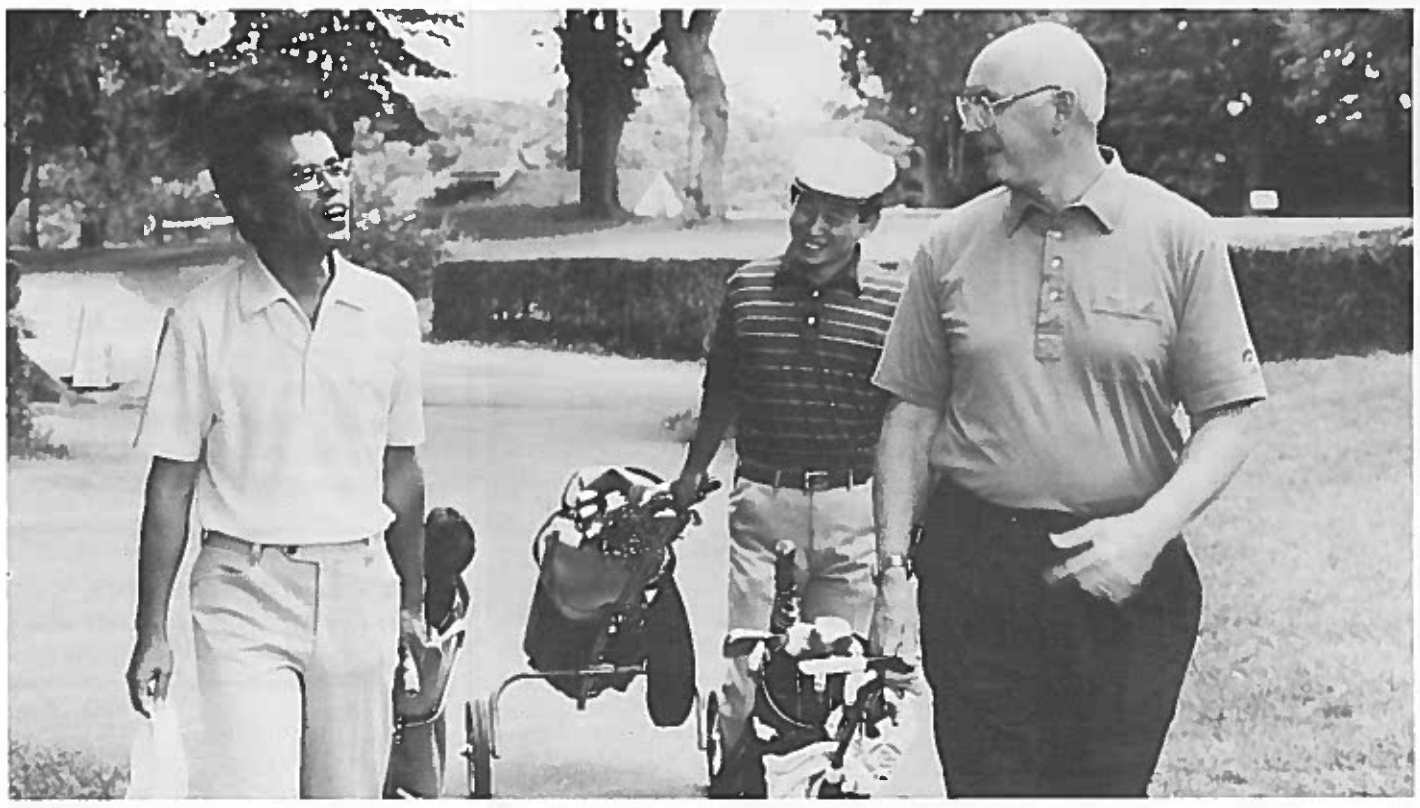
Fixed Income Fund
5.429 up from 5.308

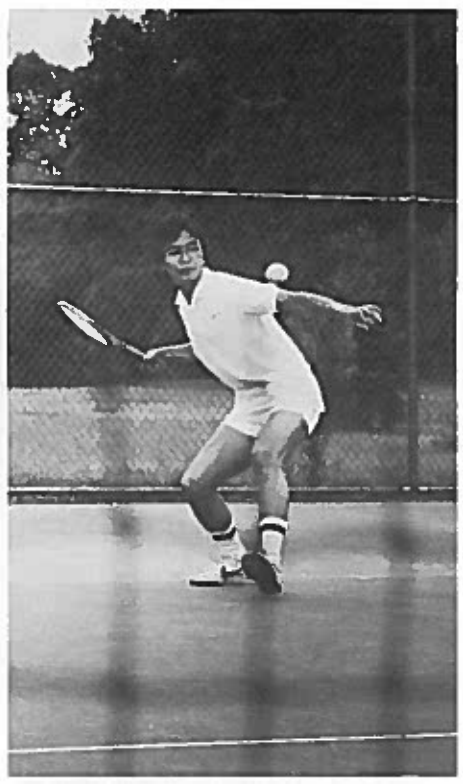
Guaranteed Income Fund
2.281 up from 2.260

Company Stock Fund
$29.06 down from $29.81

Note: It usually takes several weeks to formulate these values. EIP members can call Ext. (111) 54400 (outside Grumman, call 516-575-4400), for a recorded message which is made as soon as the new unit values are available.

Cross-Cultural Program Brings Japanese Engineers To Aerostructures





Relaxing Off The Job. *At left (L-R), Sakae Yokota and Takahisa Hasegawa enjoy a game of golf with Walter Ludwig, director of development for Grumman Aerostructures. Above, Hirobumi Tamura works on his tennis game.*

If Sakae Yokota were a restaurant reviewer, the Japanese restaurant across from his Commack, Long Island apartment would get four stars for authenticity.

He should know. His hometown is Utsunomiya, Japan. Yokota and co-workers Takahisa Hasegawa and Hirobumi Tamura are here for over a year on a special program between Grumman and Fuji Heavy Industries. The three engineers have been working at Grumman since last fall, helping design a thrust reverser and a noise-deadening liner for the G-IV/Fokker 100 nacelle.

Their presence here is part of a cooperation agreement between Grumman and Fuji. The result, at some point down the road, will be future sales, supply arrangements, or joint ventures.

"All business in Japan is built on mutual trust," says Scott Chrysler, manager—Pacific region for Corporate Development and Marketing. "You must establish such trust through friendships before you do business together."

Grumman's business with Japan includes mating the Kurbmaster to an Isuzu chassis and the sale of eight E-2C Hawkeyes to the Japanese Air Self Defense Force. "Other business programs in the formative stages, involve structures, subcontracts, joint development projects, software, electronics, and fusion," says Chrysler.

Fuji Heavy Industries is not to be confused with the company that makes camera film. Mount Fuji is a sacred place for the Japanese; many companies there are named after it. Yokota, Hasegawa, and Tamura work for Fuji's Aircraft Division in Utsunomiya, about 60 miles north of Tokyo. But Subaru cars are perhaps the best-known Fuji product in this country.

"American companies that take the time to learn the Japanese business culture do very well in Japan," notes Chrysler. For instance, the ideal time for an appointment in Japan is just before midday or 4:30 p.m. The opposite is true in America.

English is a required subject in Japanese schools, and many Japanese adults speak it well. Conversely, Japanese-speaking Americans are few in number, which can work to American businesses' disadvantage.

Yet another difference: the Japanese rely much less than Americans on contracts, and there are relatively few lawyers there. "Their word is their bond," says Chrysler.

The program benefits both companies' on a purely pragmatic level. Grumman needed experienced engineers, and Fuji had talent available to send.

Due to both U.S. and Japanese governmental restrictions, the three Fuji engineers are working on commercial projects for the Grumman Aerostructures Division. Spending a year or more at Grumman is a career boost for them. "We work in an international business," says Yokota, a structural design engineer. "Learning the American way — and the Grumman way — will be very useful for us in the future.

"We've learned many new things on the nacelle program," he continues. "In Japan, I had worked on advanced composite structures, but this is the first time I've worked on their application for acoustic treatment."

American life isn't at all new to Yokota: his wife, Kim, was born and grew up in the Seattle area, and when the two were first married, Yokota worked for two years at Boeing on a Fuji assignment. "The atmosphere at Grumman is very similar to Boeing, but perhaps a little closer to what a Japanese company is like," he notes.

All three men are married, but Hasegawa's wife, Setsue, has remained in Japan with their two small children.

The men's observations about America could probably fill several diaries. For starters, Tamura was surprised to learn that (a) Japanese food, books, and magazines could be bought in America, and (b) some Japanese television programs are broadcast here.

When a Japanese delicacy can't be obtained at the supermarket, chances are, it can be bought in Flushing, Queens, which has a large Asian-American community. Going there also gives the three men a chance to buy Japanese periodicals.

Tamura points out that in Japan, a person expresses opinions in a more obscure, roundabout fashion than in America. And distinct intonations are used when addressing one's superiors and the elderly.

"In Japan, before we say something, we think, 'Is it good to say that? Is this the right time? Can I be direct with this person?'," says Tamura, a stress analyst. "Being used to Japan, it's very surprising to see the directness Americans have. And, sometimes, Americans have a hard time understanding us, because we're not as direct with them."

This stems from a cooperative ethic ingrained in the Japanese from childhood. Japan has 120 million people occupying an area the size of California, and tolerance is a necessity.

The engineers have done quite a bit of sightseeing and travelling during their stay. They're all enthralled with New York and its cultural attractions, but make a few pointed comparisons between New York City and Tokyo.

"Tokyo is very crowded — it has more people than New York," says Tamura. "But it's cleaner and safer."

Yokota and Hasegawa have become golfers here in the U.S., while Tamura joined the Grumman Tennis Team.

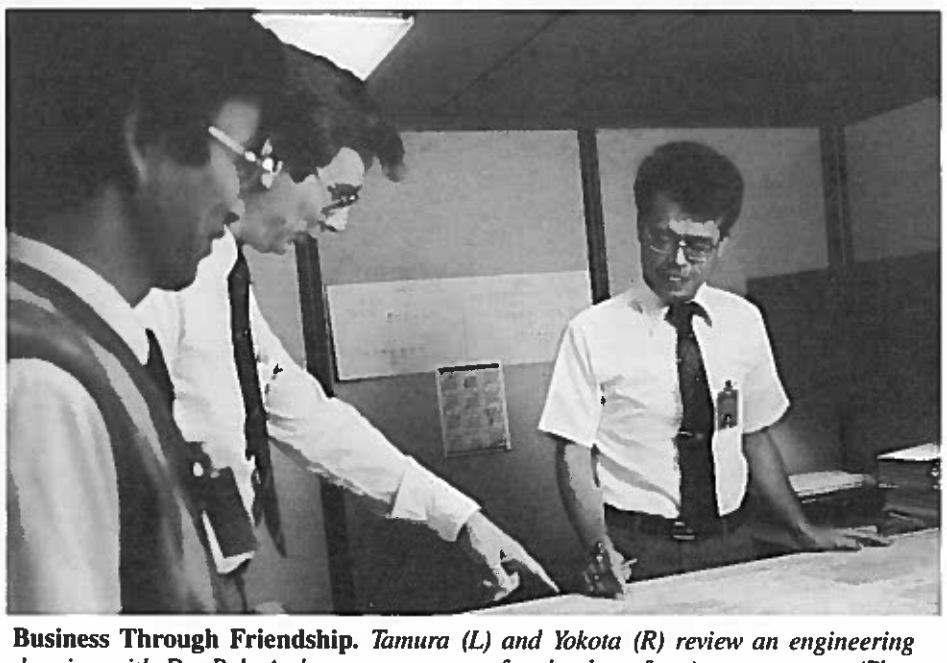
Some other observations...

Long Island: "It's a very nice place to live," says Yokota, "and the beaches are beautiful." His personal favorite: Sunken Meadow State Park.

American TV: "We understand portions of it," says Hasegawa. The easiest shows to comprehend: sports programs.

American food: "The taste is so simple," says Tamura. "In Japanese food, there is much more variety."

Grummanites: "It's a nice, friendly atmosphere," says Yokota. "The Grumman people make you feel at home." ■



Business Through Friendship. *Tamura (L) and Yokota (R) review an engineering drawing with Dr. Bob Anderson, manager of technology for Aerostructures. (Photos by Bob Settles and Rich Breunig.)*

The Schmidt Family Saves Dying Boat Class From Sinking Into Deep

A familiar sight on breezy summer nights on Long Island's Great South Bay is the 28-foot, red-and-white sail of the Witch Doctor III. Its owner and builder, Glenn Schmidt, put the wind back into the sails of its dying class: the Narrasketuck.

Schmidt, a Data Systems Proposal Center group leader in Building 237, Woodbury, and his wife, Dianne, have been sailing together for 30 years and building Narrasketucks, or "Tucks," for 18. In 1968, they built the first plywood Tuck and in 1974 converted it to fiberglass. In both cases, the Schmidts used new building techniques to help boost the class's dwindling numbers.

The Tuck was designed specifically for the Great South Bay, which is 30 miles long and only six to eight feet deep. The original 20-foot Tuck, made of plank, was built in 1935 by Wilbur Ketcham in Amityville, Long Island. The Tuck's swept-back centerboard, which protrudes from the bottom of the boat, prevents the boat from getting stuck in the bay's shallower areas.

"Sailboats that don't have this type of centerboard are limited in where they can go in the bay," says Dianne. "In shallow waters, if seaweed gets tangled in the rudder, the skipper's in trouble: the rudder controls the direction of the boat. The Tuck's centerboard design allows seaweed to pass right over it and away from the rudder."

Even though the Tuck is unique to the Great South Bay, it began to die. "Unfortunately, the class lacked modern merchandising and production techniques, plus plank sailboats were becoming too costly to build," says Glenn. "The Tuck's construction techniques had to be improved if it was going to survive."

In 1968 the Narrasketuck One-Design Association asked a naval architect to design a plywood version. He was directed to rigidly maintain the exterior lines of the original design and provide a low cost, competitive racing boat equal to existing Tucks with a minimum weight of 800 pounds.

As Association members, Glenn, Dianne and John Titterington, also an experienced local builder, were asked to build the first three plywood Tucks. "We were all willing to work hard at maintaining the life of the Tuck," says Glenn.

It took six months to build the three sailboats. "Dianne would pound nails into the boats all day long and John and I would work on them from 6 to 11 p.m.," recalls Glenn. "Plus the three of us put in 12 hours a day on the weekends."

A few years after they built the plywood boats, the Schmidts realized that once again the Tuck was destined for extinction due to the arrival of fiberglass. In 1971, Glenn began looking for a partner to help him finance a fiberglass Tuck.

"Because the Tuck isn't an international class, no one wanted to help. And, finally, when a builder did approach me to help finance the project, he wanted to redesign the Tuck," explains Glenn.

After three years of searching, Glenn found someone who wanted to preserve the sailboat class as much as he did — Dave Faber, another Tuck owner. "Dave, Dianne and I own the rights to the mold and have built 12 fiberglass Tucks since 1974," he says.

Each sailboat takes them four months to build, costs about $7,000 and is sold for about the same price. "It's a relaxing hobby — we're not in it for the business," says Dianne. "Building Tucks perpetuates the love we have for sailing."

"Dianne and I believe that sailing is one of the best sports kids can get involved in," says Glenn. Their daughters, now 27 and 29, began sailing at the age of seven.

"Plus, it's an exceptional racing boat," says Glenn, who is president of the Great South Bay Yacht Racing Association. "There were only seven Tucks racing on the Bay when we built the fiberglass version. Now there are 18."■

Sailing Into The Sunset. *The Schmidts end an enjoyable day of sailing aboard the Witch Doctor III. (Photos by Rich Breunig)*

Enjoying Their Favorite Pastime. *Glenn Schmidt, a Grumman proposal group leader for Data Systems in Woodbury, L.I., and his wife, Dianne, have been sailing together for 30 years. They implemented new building techniques to save the Narrasketuck sailboat class from dying.*

Money Back Offer

The Tuition reimbursement program now includes career training programs at Grumman Data Systems Institute. The new policy reimburses Grummanites who take any of GDSI's eight business, data processing and technical programs. The amount of reimbursement depends on a student's final grade in each course. Two of the programs include courses which are not reimbursable. For specific information contact Phil Cincotta in Woodbury at 682-5080 or Jerry Agostisi in Bohemia at 467-6690. GDSI offers day and evening schedules at these two Long Island locations.

Patently Praised

Four Grummanites came up with an invention that earned a patent for the company recently.

Fred Edelstein, Bob Haslett, and Bob Kosson, who work in Bethpage, and Bill Harwell in Irvine, California, developed the "Capillary-Pumped Heat Transfer Panel and System." Their invention efficiently transports heat produced by electronics and other equipment in large satellites and space vehicles.

Obituaries

Domenico L. Faraci of Details, Melville, Aircraft Systems, died August 10 at the age of 26. He had been with the company since 1985 and resided at 15 Somerset Ave., Garden City, N.Y.

Retiree Obituaries

Percy Donley of 2287 NE Center Cir., Jensen Bch., Florida, died August 1, 1986. He retired in 1970.

Howard Farrell of Lawrence Rd., Kings Park, N.Y., died July 31, 1986. He retired in 1968.

Walter L. Harper of 2899 NE Hickory Rd., Jensen Bch., Florida, died July 31, 1986. He retired in 1984.

Russell L. Johnson of 124 Bucknell Rd., West Sayville, N.Y., died August 9, 1986. He retired in 1977.

William Lomnicki of 132 Bayview Ave., East Islip, N.Y., died August 9, 1986. He retired in 1977.

William C. MacLaury of 8 Ocean Ave., Massapequa, N.Y., died August 9,1986. He retired in 1977.

Carrie L. Miles of 26 Oakland St., Hempstead, N.Y., died July 30, 1986. She retired in 1984.

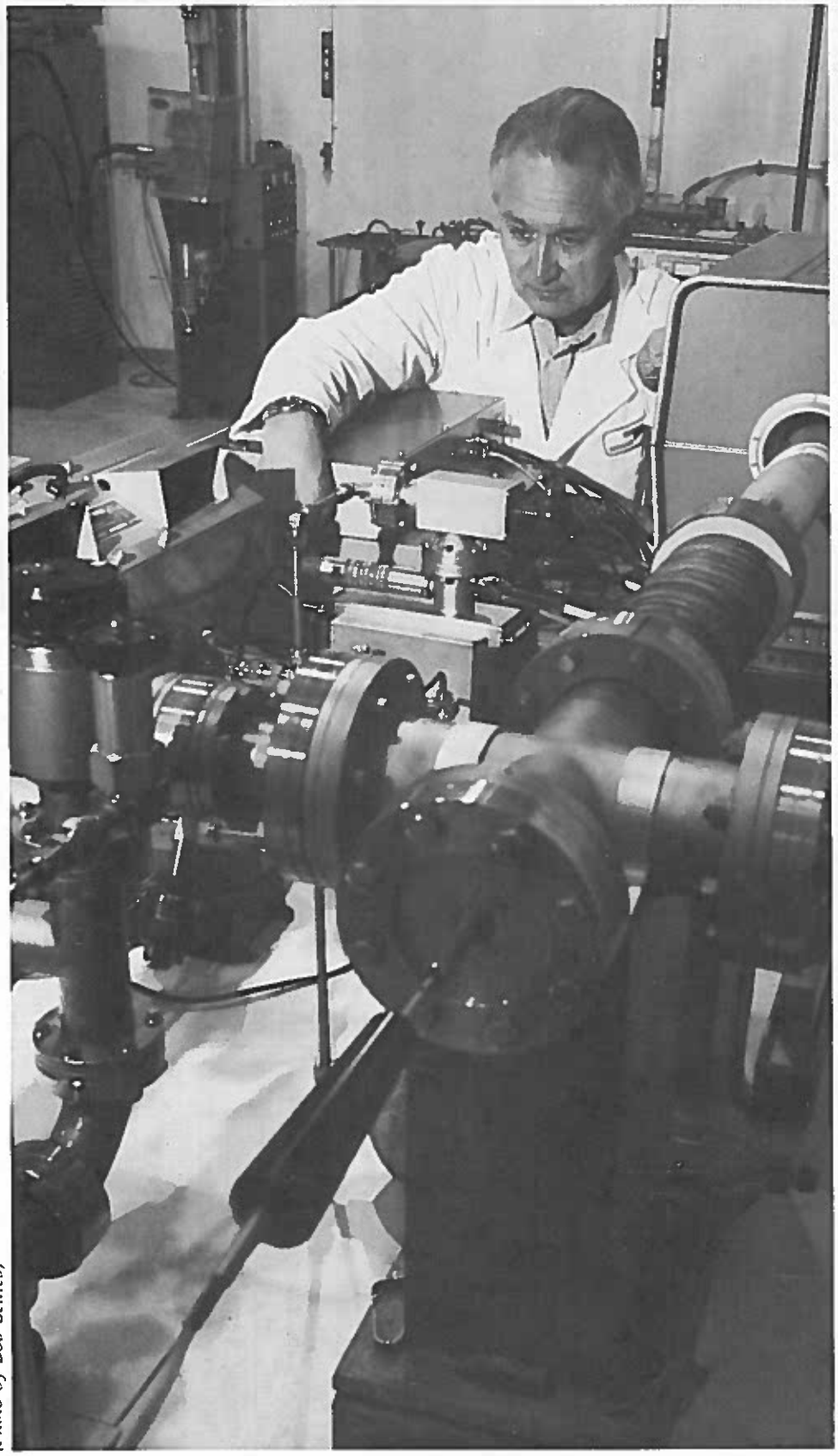
Louis N. Nettuno of 60 DelPrado, Pt. St. Lucie, Florida, died August 10, 1986. He retired in 1973.

Vincent Schibani of 16 Plitt Ave., Farmingdale, N.Y., died August 4, 1986. He retired in 1974.

Percy O. Smith Jr. of 5 Cedar Grove Rd., Southington, Connecticut, died August 8, 1986. He retired in 1985.

John Tylinski of 16 Sedgewick La., Stony Brook, N.Y., died August 6, 1986. He retired in 1984.

GrummanWorld
September 12, 1986



(Photo by Bob Settles)

Cracking The Case Of The Brittle Metal

Research technician Bill Poit conducts experiments to determine why hydrogen causes titanium alloys to become brittle.

The experiments are part of the Environmental Degredation Program in the Materials Science Laboratory of the Corporate Research Center in Bethpage. Titanium is extensively used for Grumman airplane parts.

Using a Siervert apparatus, Poit can control how much hydrogen is filtered into the main tube, which contains samples of different titanium alloys. A meter indicates how much hydrogen is filtering into the tube, how much is being absorbed by the samples, and how much is left in the tube after the samples are cooled down. Poit then logs his findings, which are analyzed for further research.

The Sieverts apparatus is also used to determine how hydrogen affects other high-strength materials for aircraft, such as aluminum lithium alloys.

Grumman Dependents Encouraged To Compete For 1987 Scholarships

Tuition grant increases to $6,000 per student in '87

Applications for the 1987 Grumman Science and Engineering Scholarships are now available. All Grumman sons and daughters who are high school seniors interested in engineering or science careers are eligible to compete. Application deadline is November 1.

Each year, Grumman awards a minimum of 12 scholarships. In 1987, the company will increase its yearly grant to $6,000 per student. Approximately half of the scholarships go to sons and daughters of Grummanites all over the country; the remainder to Long Island high school seniors.

Scholarship winners are also offered summer employment and a permanent job with Grumman after they graduate college.

Applications are available in Grumman administration offices throughout the country and at high school guidance offices on Long Island.

For more information, contact Paul Sluiter in the Scholarship Office, (516) 575-2682 or Ext. (111) 52682.

Retirees

On behalf of our fellow workers, *Grumman World* salutes the following Grummanites for their contributions to the company and wishes them well in their retirement:

Frank T. Orobona (2), Ignatius Fiorino (6), Carmen DeCianni (2), Frank Archacki Jr. (3), Robert S. Saputo (25), Dorothy Ertola (111), David Mottoli (43), Robert Milau (12), Richard L. Heidemann (12), Dorothy G. Heidemann (18), Robert K. Smyth (66), Albert Margarita (110), William R. Caspersen (55), Walter H. Woelfel (12), Madelaine R. Deyns (1), Antonina M. Costa (237), Robert J. Stewart (GA), Peter B. Arigo (12), Erling M. Holm (8), Edward J. Roe (2), Vincent A. Crocco (6), Robert S. DeSolms (6), Jerome A. Salvato (15), Frank T. Calderone (30), Dolores M. Haddas (77), Paul C. Davis (6), Robert A. Hess (5), Andrew Guszack (6), Richard F. Alfred (6), Hans G. Biegler (6),Philip H. Kurz (6), Raymond E. Jeffrey (6), Eugene Sirota (43), Bruno J. Cereghino (43), George E. Garner (12), Alice J. Quick (43), James B. Bianchini (112), Anthony Benevento (3), Concetta Gagliardi (5), Herbert E. Schmidt (2), Roy J. Champagne (35), Rupert A. Bentley Jr. (28), John A. MacLean (15), Gerald H. Hermges (2), Albert Axelrod (5), Walter Rohback (2), William J. Cross (110), Robert E. Boehning (1), George W. Wadkinson (110), Felix J. Curasi (5), William H. Garing (30).

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